



THE EMERGENCY RESPONSE GUIDE TO ALTERNATIVE FUEL VEHICLES



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Disclaimer

This student manual is intended for use by trained personnel who have extensive emergency response training. Members of the public should not attempt to respond to an emergency involving vehicle fires or collisions but should instead contact emergency response personnel.

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This student manual provides general background information and should not be used as a substitute for any detailed information that may be available from the manufacturer with respect to each vehicle’s design and safety features.

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Chapter I.

INTRODUCTION

I. INTRODUCTION

The objective of this text is to prepare emergency medical, law enforcement, and fire service personnel for an emergency response to alternative fuel vehicles. It is important to note, that this text deals exclusively with vehicles built by original equipment manufacturers (OEM's). After market vehicle conversions are not within the scope of this program. The focus of this training program is also limited to road worthy vehicles such as passenger cars, light trucks, vans, sport utility vehicles, heavy duty vehicles, as well as transit vehicles like school, tour, and municipal busses. Off road vehicles, motorcycles, golf carts, and forklifts are not discussed in this program. However, the alternative fuel/energy technologies discussed in this program may also be extrapolated and applied to vehicle conversions and off-road vehicles as well.

This text explores the basic operation of alternative fuel vehicles, their component parts, infrastructure, and importantly, how this technology affects our standard operating procedures.

The goal of this text is to separate the mythology surrounding alternative fuel vehicles and focus instead on the reality of emergency response. This requires a great deal of guess-work in that, in the context of the millions of vehicles on the road today only a small percentage alternative fuel vehicles compete with gasoline or diesel vehicles, and even fewer alternative fuel vehicles have been involved in accidents.

Any discussion of alternative fuel vehicles must begin with an understanding of how and why this technology has suddenly come to our attention. Three interests- air quality, energy diversity, and the innovation of the auto industry have converged to make these vehicles today's reality. While the concept of alternative fuel vehicles may conjure images of the technological future, you must realize that many of the technologies we are going to explore have actually competed for a market share along with steam and internal combustion engines over 100 years ago.

The question begs to be asked- what exactly is riding on this wave of vehicle technology? The short answer is National Security. America needs to reduce its reliance on imported fuel stocks from countries who aim to use the profit from our purchase to undermine the security of our nation. Global warming and our use of fossil fuels is also cited as a motivating factor in finding sustainable alternatives to gasoline and diesel fuels.



The 405 Freeway in Los Angeles is one of the busiest in the country. Vehicular traffic adds to poor air quality in the Los Angeles Basin.



1912 Detroit Electric Car

*The key to America's
homeland security is
in the development of
sustainable alternative
fuel sources.*

To this cause, billions of dollars are spent in research and development by the automotive industry to provide better air quality, and greater diversity of transportation energy sources. Long before Federal and State Governments began mandating energy diversity and air quality standards, original equipment manufacturers (OEMs), electric utilities, independent companies, and the academic community began re-searching, testing, and developing vehicles powered by a range of fuel/energy options. Clearly, the automotive industry perceived a unique niche in the market and its members have been racing one another ever since to fill the void.



In 1992, Congress approved, and the President signed, the National Energy Policy Act. The National Energy Policy Act establishes a national goal to reduce petroleum consumption by 10 percent by 2000 and 30 percent by 2010. The Act had many requirements for developing alternatives to petroleum use in the transportation sector. These requirements apply primarily to government and private fleets and encourage the purchase and use of all types of alternatives to petroleum, including a tax credit for refueling facilities. Specific to alternative fuel vehicles, the Act provides tax credits for their purchase. The goal of this

Act is to decrease America's reliance on foreign oil by developing alternative domestic energy sources.

The most obvious target for fuel diversification and air quality is the millions of vehicles on American roads. Mobile sources are the largest source of air pollution. Cars and trucks are the main source of smog forming pollutants and carbon monoxide. Cars and trucks aren't the whole story, heavy-duty diesel trucks and off-road sources such as locomotives, ships, and utility engines also contribute to the air pollution problem.

Even though technological advances mean that new internal combustion vehicles produce about 80 percent less pollution than vehicles from the 1970's, increases in population, number of vehicles, and miles driven continue to offset the benefits of these cleaner cars. Zero emission vehicles, or "ZEVs," were required to have no tailpipe emissions under any and all modes of operation for the life of the vehicle. Today, the only vehicles that can meet this standard are fuel cell and

electrically powered vehicles, although fuels like natural gas, propane and hydrogen also offer very low emissions.

Surprisingly, the same issues that confronted the automotive industry 100 years ago are the same issues that face us today. Solutions to modern problems like air pollution and energy diversity are riding on the successful reintroduction of alternatives to fossil fuel vehicles. Along with this re-emerging technology comes the uncertainty of how new vehicle technology fits within the context of our day-to-day lives. It is a context that often includes: daily commutes, rush hour traffic, traffic jams, servicing, automotive repairs, occasional tows, and yes, vehicle incidents, accidents and collisions.

The text you hold in your hand has been 15 years in the making. This book combines the training programs that have been produced for a variety of alternative fuel vehicle programs as they have “come of age” over the years. These projects span from electric vehicles, the vehicle of choice in the mid 1990’s to Fuel Cell Vehicles, the vehicle of choice for tomorrow. In between we have also seen propane, natural gas, hybrid electric, and bio-fuels as other alternative fuel choices.

The fact is, our dependence on fossil fuels and the environmental impact of using them have driven many vehicle manufacturers to find solutions to moving people from point A to point B and to do it economically and in an environmentally safe manner. Today the alternative vehicle choices offered by original equipment manufacturers (OEMs)



Alternative fuel vehicles: Top L-R Mercedes c300 Flex Fuel, Toyota Prius Hybrid, Bottom L-R Honda Civic CNG, Ford Roush F150 Propane

Alternative Fuel Vehicles Offered by Original Equipment Manufacturers

Chrysler	
Chrysler Aspen - Ethanol	Chrysler Sebring - Ethanol
Dodge Avenger - Ethanol	Dodge Dakota - Ethanol
Dodge Durango - Ethanol	Dodge Grand Caravan - Ethanol
Dodge Ram Pickup - Ethanol	Jeep Commander - Ethanol
Jeep Grand Cherokee - Ethanol	Town and Country - Ethanol
Ford	
Crown Victoria - Ethanol	Crown Victoria Police - Ethanol
Escape Hybrid - Hybrid Electric	F-150 - Ethanol
F-150 LPI - Propane	Grand Marquis - Ethanol
Lincoln Town Car - Ethanol	Mercury Mariner - Hybrid Electric
GMC – Chevy	
Avalanche - Ethanol	Express - Ethanol
Impala - Ethanol	Malibu - Hybrid Electric
Police Impala - Ethanol	Police Tahoe - Ethanol
Silverado - Ethanol	Suburban - Ethanol
Tahoe - Ethanol	Tahoe - Hybrid Electric
Uplander - Ethanol	
GMC	
Savana - Ethanol	Sierra - Ethanol
Yukon - Ethanol	Yukon - Hybrid Electric
Yukon XL - Ethanol	GMC – Saturn
Aura - Hybrid Electric	VUE Green Line - Hybrid Electric
Honda	
Civic - Hybrid Electric	Civic GX - Natural Gas
FCX - Hydrogen	
Mazda	
Tribute - Hybrid Electric	
Mercedes	
C300 Sport Sedan - Ethanol	
Nissan	
Altima - Hybrid Electric	Armada - Ethanol
Titan - Ethanol	
Toyota	
Camry - Hybrid Electric	Highlander - Hybrid Electric
Lexus GS 450h - Hybrid Electric	Lexus LS 600h - Hybrid Electric
Lexus RX 400h - Hybrid Electric	Prius - Hybrid Electric

include; neighborhood electric vehicles, hybrid electric vehicles and ethanol powered vehicles. Hydrogen and fuel cell vehicles are coming-up in the not too distant future. Fleet vehicles and mass transit systems run the range of all electric, hybrid electric, natural gas and propane, to fuel cell technologies. Even though as a consumer you are limited in choices that include primarily ethanol and hybrid electric vehicles—this training program will prepare you for the wider range of fleet and future alternative fuel options that are just around the corner.

The solution to our dependence on fossil fuels appears to be not just one alternative fuel/energy source but a plethora of choices in a variety of vehicle make and models that we normally associate with internal combustion technology (ICE).

Realize that vehicles, no matter how the vehicles are fueled, may eventually end-up in a collision or become involved in fire which will, in-turn impact you as the emergency responder. The fuel/energy available today requires emergency responders to have an understanding and appreciation of the situations they may already be facing or will be facing in the very near future.

Program Goal

This training program will provide fire, emergency medical, and law enforcement personnel information for each of the alternative fuel technologies available so that they can make informed decisions at the scene of a vehicle emergency.

Objectives

The objectives to meet this goal include:

- ❖ Insure safety for emergency response personnel by providing reference and training material for all the alternative fuel/energy technologies available.
- ❖ Spotlight hazards associated with each fuel/energy source
- ❖ Review the infrastructure that supplies the fuel/energy to alternative vehicles
- ❖ Demonstrate that Standard Operating Guidelines (SOG's) are applicable to the new fuel/energy technologies.



‘ *Realize that vehicles, no matter how the vehicles are fueled, may eventually end-up in a collision...* ’

This training program is divided into three sections: Internal Combustion Vehicle Technologies, Electric Vehicle Technologies and Response to Vehicle Emergencies. The training materials have been modularized so that they can be taught as each technology becomes prevalent in your jurisdiction and/or taught in conjunction with auto extrication training. The modular format is appropriate for tailboard training or can be taught in its totality as an instructor lead training program.

Like all training programs we start with the known and work towards the unknown. In this case with internal combustion vehicles and the alternative fuels that support them and then on to electric vehicle technologies and the infrastructure that support those. All of this technical information will be tied together in the “Response to Vehicle Emergencies” section.

Importantly, emergency response guidelines (ERG’s) for specific make and models of vehicles are not included in this text. New vehicles and their specific configurations change from model-to-model and year-from-year. This text presents a generic configuration of the fuel/energy technologies. It is highly recommended that you go to the original equipment manufacturer for specific emergency response guidelines.